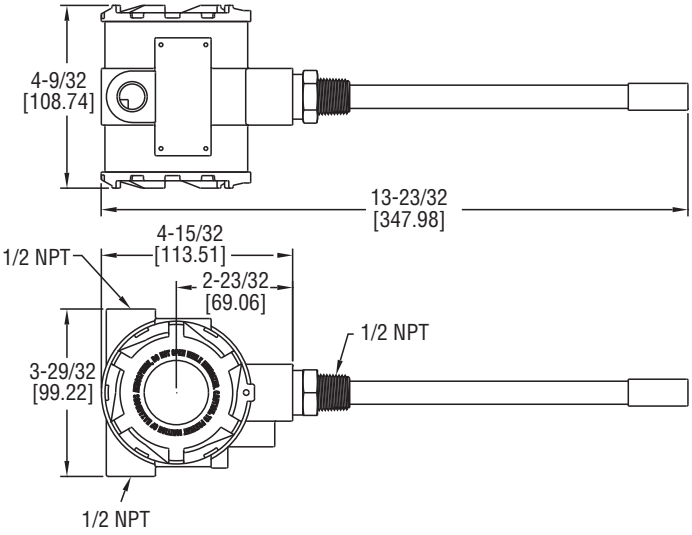
Series HHT Hazardous Area Humidity/Temperature Transmitter

Specifications - Installation and Operating Instructions



The Series HHT Hazardous Area Humidity/Temperature Transmitter takes accurate measurements in the harshest of environments. The transmitter is offered in explosion-proof and intrinsically-safe versions depending on the applications requirements. The explosion-proof model is offered with 4 to 20 mA outputs for humidity only. The intrinsically-safe version is offered with 4 to 20 mA output for humidity and temperature. Both versions have an optional two line alphanumeric display to show the current humidity and temperature.

The Series HHT humidity/temperature transmitter is excellent for offshore HVAC applications, dust and grain applications.

SPECIFICATIONS

Relative Humidity Range: 0 to 100% RH.
Temperature Range: -40 to 140°F (-40 to 60°C).
Accuracy: ±2% 10-90% RH, ±0.9°F at 72°F (±0.3°C at 25°C).
Hysteresis: ±1%.
Repeatability: ±0.1% typical.
Temperature Limits: -40 to 140°F (-40 to 60°C).
Storage Temperature: -40 to 176°F (-40 to 80°C).
Compensated Temperature: -40 to 140°F (-40 to 60°C).
Power Requirements: For intrinsically safe models HHT-IX, 9.5 to 28 VDC. For explosion-proof models HHT-EX, 16.5 to 28 VDC.
Output Signal: 4-20 mA, 2 channels for humidity/temperature models (loop power on RH).
Response Time: 15 seconds.
Electrical Connections: Screw terminal block.
Conduit Connection: 1/2 female NPT.
Drift: <1% RH/year.
RH Sensor: Capacitance polymer.
Temperature Sensor: Solid state band gap.
Housing Material: Aluminum.
Display: Optional 2 line alpha numeric, 8 characters/line. Temperature
display is ˚F/˚C selectable.
Display Resolution: RH: 0.1%: Temperature 0.1°F (0.1°C).
Weight: 2 lb 8 oz (1134 g).
Enclosure Rating: NEMA 4x (IP66). Models HHT-EX: FM Explosion Proof, Class I Div. 1 Group B, C, D, Class II Div. 1 Group E, F, G, Class III Div. 1; Models HHT-IX: FM Intrinsically Safe, Class I Div. 1 Group A, B, C, D, Class II Div. 1 Group E, F, G, Class III Div. 1 T4.
Agency Approvals: FM, CE.

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Wiring Diagram – Humidity Only
Explosion Proof Installation Notes:

1. Install in accordance with any applicable national electric code.
2. Plug unused conduit openings. Plug must engage a minimum of 5 threads.
3. Use conduit seal within 18 inches of conduit entry.
4. Disconnect power before servicing.
5. Control equipment voltage on hazardous side is 250 Vrms/DC maximum.
6. Do not substitute any components. The intrinsic safety of the sensor may be compromised.
7. Shielded cable for 4-20 mA loop is necessary to meet CE requirements or when used in electrically noisy environments.

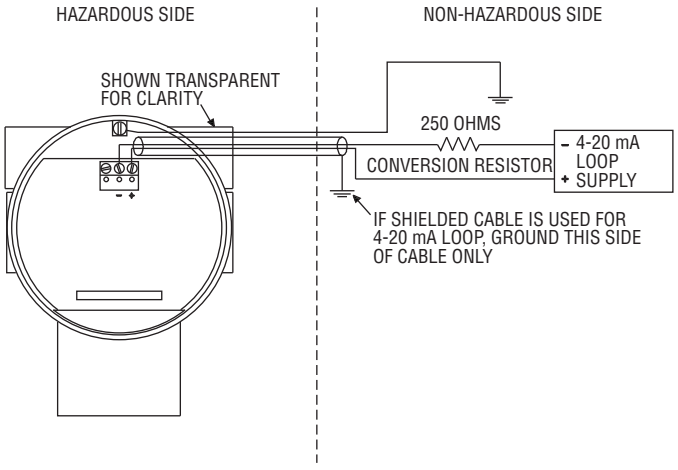

FIGURE 1

Wiring Diagram – Humidity and Temperature
Intrinsically Safe Installation Notes:

1. Remove power from the instrument before carrying out any servicing.
2. Return the instrument to the manufacturer for any repair. Any unauthorized repairs may impair the intrinsic safety of the instrument.
3. Use only FM approved Associated Apparatus. When installing the Associated Apparatus, the manufacturer's instructions must be followed.
4. Install in accordance with ANSI/ISA RP12.06.01, and the National Electric Code ANSI/NFPA 70.
5. The earth terminal on the housing must be wired to a local earth ground in the hazardous area.
6. Refer to FM control drawing, Dwyer number 03-001467-00.
7. For Model HHT-IT, use ONLY Pepperl + Fuchs KFDØ-SCS-Ex1.55 Galvanically Isolated Barriers.

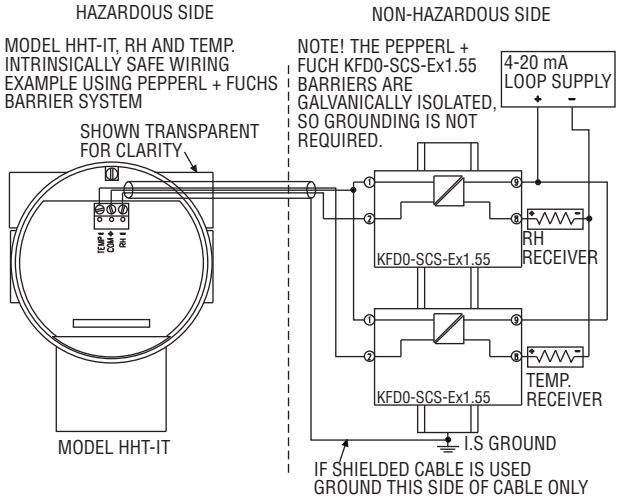

FIGURE 2

Entity Parameters:
Vmax = 28 VDC
Imax = 100 mA
Ci = 62 nF
Li = 7.7 µH
Pi = 651 mW

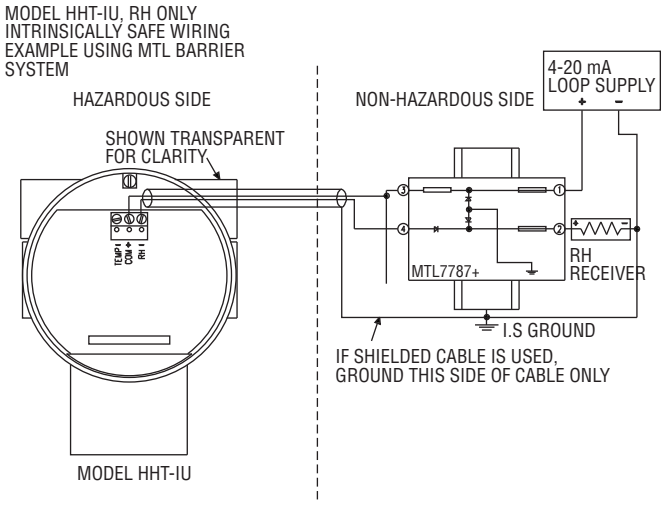

FIGURE 3

Power Supply Requirements:
The maximum DC Power Supply is 28 VDC. The minimum required DC Power Supply required is based upon the following:
1. Minimum DC voltage requirement of the Model HHT.
2. Total load resistance.
3. Total leadwire resistance.
4. Zener barrier voltage drop (Model HHT-IX only).

The formula for calculating the DC Power Supply is:
VDC = VHHT + VLOAD + VLEADWIRE + VBARRIER

Where VHHT = 9.5v for Models HHT-IX and 16.5v for Models HHT-EX.
VLOAD = Total load resistance X 20mA
VLEADWIRE = Total leadwire resistance X 20mA
VBARRIER = 8.1v
(Typical zener barrier voltage drop for this application)

Example 1. Calculate minimum DC Power Supply for Model HHT-EX (Explosion Proof)
Step 1. VHHT = Minimum voltage required by Model HHT-EX = 16.5 v
Step 2. Calculate VLOAD. Using the industry standard 250 OHM conversion resistor, VLOAD = 250 X 20mA = 5v.
Step 3. Calculate VLEADWIRE. For this example assume a leadwire resistance of 10 OHMS. VLEADWIRE = 10 X 20mA = 0.2v
Step 4. VDC = VHHT + VLOAD + VLEADWIRE = 16.5 + 5 + 0.2 = 21.2v

Example 2. Calculate minimum DC Power Supply for Model HHT-IU (Intrinsically Safe)
Step 1. VHHT = Minimum voltage required by Model HHT-IX = 9.5 v
Step 2. Calculate VLOAD. Using the industry standard 250 OHM conversion resistor, VLOAD = 250 X 20mA = 5v.
Step 3. Calculate VLEADWIRE. For this example assume a leadwire resistance of 10 OHMS. VLEADWIRE = 10 X 20mA = 0.2v
Step 4. VBARRIER = 8.1v
Step 5. VDC = VHHT + VLOAD + VLEADWIRE + VBARRIER = 9.5 + 5 + 0.2 +8.1 = 22.8v

For Model HHT-IT, follow instructions with Pepperl + Fuchs KFDØ-SCS-Ex1.55 Barrier.

INSTALLATION

Location: Select a location where the ambient temperature is between –40 to +140°F (-40 to +60°C)
Position: The transmitter is not position sensitive. Units with the optional display should be mounted for ease of viewing the display.
Caution: Use electrostatic discharge precautions (e.g. use of wrist straps) during installation and wiring to prevent equipment damage.
Avoid locations where severe shock or vibration, excessive moisture or corrosive fumes are present.
Do not exceed ratings of this device. Permanent damage not covered by the warranty may result.
Display: The temperature indicated on the display, if equipped with the LCD option, is field selectable via a jumper located on the circuit board just above the display. To change the jumper position, remove the housing cover and position the jumper for °F or °C according to Figure 4.

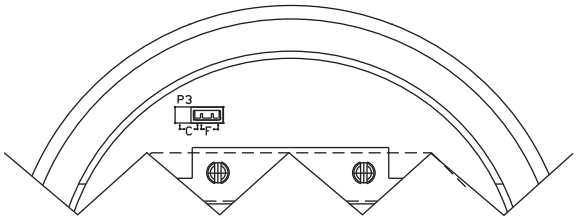

FIGURE 4

Replaceable RH/Temperature sensor and sintered filter:
Replacement sensors are available. No calibration is required when a new sensor is installed. To replace the sensor, remove the sintered filter. When installing the new sensor, make sure the 4 pin male connector is aligned correctly with the female connector. See Figure 5.

To order a replacement sensor or sintered filter, contact Dwyer sales. The part numbers are:
Replacement 2% sensor : A-451
Replacement sintered filter: A-450

FIGURE 5

MAINTENANCE
Upon final installation of the Series HHT Hazardous Area Humidity / Temperature Transmitter, no routine maintenance is required. A periodic check of system calibration is recommended. The Series HHT is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

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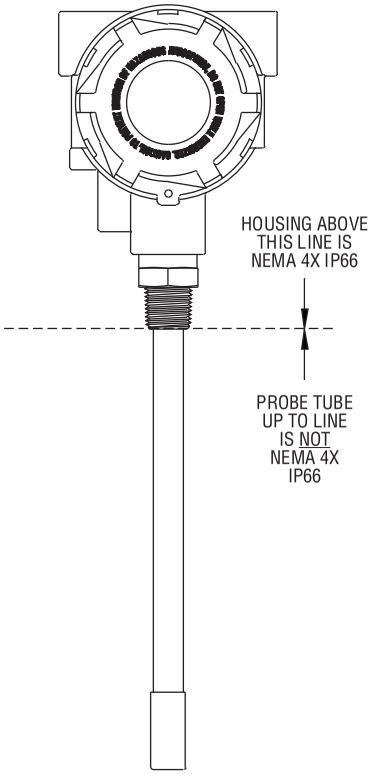

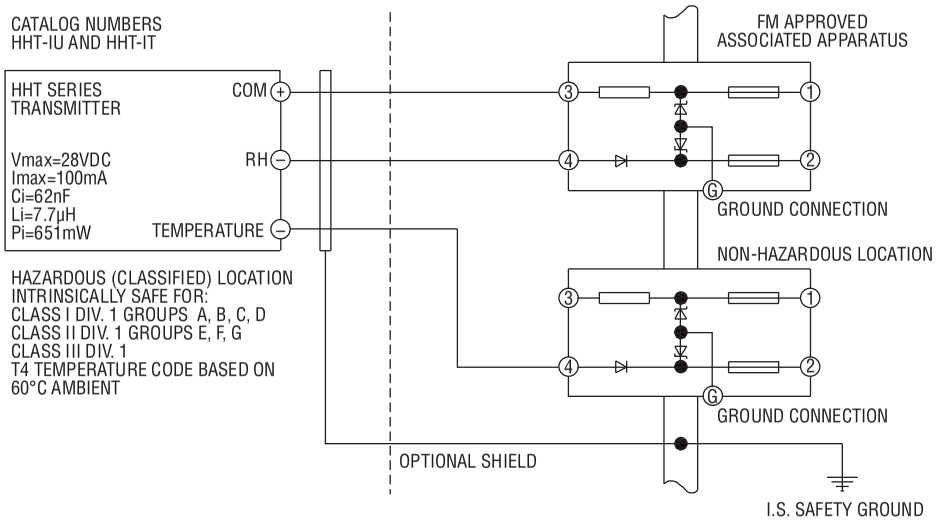

1. THE INTRINSIC SAFETY ENTITY CONCEPT ALLOWS THE INTERCONNECTION OF TWO FM APPROVED INTRINSICALLY SAFE DEVICES WITH ENTITY PARAMETERS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM WHEN:
   Voc OR Uo OR Vt ≤ Vmax, Isc OR Io OR It ≤ Imax, Co or Co ≥ Ci + Ccable, Lo OR Lo ≥ Li + Lcable, Po ≤ Pi
2. EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAT 250 Vrms OR VDC
3. INSTALLATION MUST IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NFPA 70, ARTICLE 504) AND ANSI/ISA-RP12.6
4. NO REVISIONS WITHOUT PRIOR APPROVAL FROM FM RESEARCH.
5. THE ASSOCIATED APPARATUS MANUFACTURES INSTALLATION INSTRUCTIONS MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
6. DUST TIGHT CONDUIT SEAL MUST BE USED IN CLASS II AND CLASS III ENVIRONMENTS.

FM CONTROL DRAWING

SCALE 1:2

(CD) = CRITICAL DIMENSION
STANDARD TOLERANCES UNLESS NOTED:
ALL DECIMAL DIMENSIONS ± .005
ALL ANGLES ± 1°

NO.	CHANGES	BY/DATE

DATE: 8-25-08
DWN BY: KAS
CHKD: CAT
APPD: LRR
NAME: FM CONTROL DRAWING HHT-IU AND HHT-IT
ACAD2002
MATERIAL:
FINISH:
DWYER INSTRUMENTS, INC.
MICHIGAN CITY, INDIANA 46360 U.S.A.
FR. NO. 03-001467-00

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